Lecture 1. Shocks, Factor Prices, and Unemployment.*

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*Griliches lectures, Moscow, November 2001

What happened in Europe in the 1970s?

The end of the "30 glorious years". (Fourastié). A dramatic slowdown in productivity growth. (Figure, from Piketty, for France, from 1900 to 2000).

Led to strong movements in factor prices, real wages and real interest rates.

Both clearly contributed to the increase in unemployment in the 1970s and the 1980s. Can they explain high unemployment into the 1990s?

The road map

- A simple model of labor supply and labor demand, with capital accumulation. Useful to clarify mechanisms, look at the data, and build on later.
- The dynamic effects of a slowdown in total factor productivity growth
- The dynamic effects of swings in real interest rates
- An application to France. Progress and issues.

A SIMPLE MODEL

- The basic structure.

  A production function, leading to a short-run and a long-run demand for labor.

  A wage setting relation.

- Obviously too simple minded:

  No role for nominal rigidities, no difference between actual/equilibrium (natural) unemployment rate.

  Is it reasonable to focus exclusively on equilibrium unemployment? A simple computation:

$$\Delta pi = -\alpha(u - u^*) \Rightarrow u^* = u + \frac{1}{\alpha}\Delta pi$$

  Figure for u, u^*. Close. $u^* > u$ in the 1970s, $u > u^*$ in the 1980s. Reverse causality? Early hysteresis hypotheses (Tight money, low demand, high u, leading to high u^*.)

- How do institutions matter in this model? Slope, nature of wage setting relation, costs underlying labor demand and costs of adjustment. All hidden for the time being.

- Netherveless, the model as such goes a long way. Not all the way, but a long way.

Labor demand and wage setting

- A production function $y = F(an, k)$, where a is labor–augmenting technological progress, growing at rate g_a. Call an labor in efficiency units.

- The **short-run labor demand**:

$$\frac{an}{k} = f(\frac{w}{a}) \qquad f'(.) < 0$$

  Relation between the ratio of labor in efficiency units to capital, and the wage in efficiency units. Convenient to rewrite it as:

$$n = \frac{k}{a} f(\frac{w}{a})$$

  Given k/a, employment a decreasing function of w/a. Drawn as downward sloping curve DD in Figure 1.

- **The long run labor demand**:

  User cost of capital is given, and equal to c. Profit rate denoted by by π. In the long run:

$$c = \pi = g(\frac{w}{a}) \qquad g'(.) < 0$$

  For a given c, there is a unique value of (w/a) so firms make zero net profit. This relation is drawn as the horizontal line LL in Figure 1.

- **A wage setting relation**:

  Labor force normalized to 1, so u denotes both the unemployment level and the unemployment rate.

$$\frac{w}{a} = z\, h(u) \qquad h'(.) \leq 0$$

  Drawn as the upward sloping relation SS in Figure 1. (Institutions hidden in z and $h(.)$

The balanced path, and equilibrium unemployment

Equilibrium at A in Figure 1, with associated n, u and (w/a)

At A, the unemployment rate is such that the wage in efficiency units leads to zero net profit, and so firms are willing to invest.

At A, output, capital, and employment and the wage in efficiency units, all grow at rate g_a.

The effects of shocks

Can then use the model to think about the dynamic effects of various shocks:

- A slowdown in tfp growth. The 70s

- An increase in the real interest rate (and by implication in the user cost c). The 80s and early 90s

THE SLOWDOWN IN TFP GROWTH

- The evidence: Evolution of g_a (can be constructed as the Solow residual divided by labor share). From 5% in the 1960s to less than 2% by the 1980s. Figure for E15, E5, and each of the E5. (Difference with the US)

- Implications? (nearly) none if fully understood as it happens: g_a decreases, but $u, n, (w/a)$ remain the same.

- Missing something? Yes, it clearly took some time to understand what was going on. (oil prices, raw material prices, making it harder). Learning.

A formalization and its implications

- Change the wage setting equation to:

$$\frac{w}{a^*} = z\ h(u)$$

  Equivalently:

$$\frac{w}{a} = z'\ h(u) \qquad \text{where } \ z' \equiv z\ \frac{a^*}{a}$$

- If (a^*/a) exceeds 1 for some time, z' higher than z for some time. This has two effects:

  - (w/a) goes up. Firms decrease labor given capital.
  - π goes down, so capital goes down as well.
  - Unemployment goes up on both counts (lower (an/k), lower k).

- A graphical representation: Figure 2. Shifts of DD to the left, then later to the right. A period of higher unemployment.

How much unemployment, for how long? A simulation:

Need two components

- A specification of (a^*/a) as a function of decrease in g_a.

  From some time, say $t = 0$, workers believe there may have been a permanent decrease in g_a. So, from $t = 0$ on, workers adjust g_a^* according to:

$$g_{at}^* = \lambda g_{at-1}^* + (1 - \lambda) g_{at}$$

  Given g_a^*, workers then compute their perceived level of a according to:

$$\log a_t^* = \log a_0 + t g_a^*$$

  Choose $\lambda = .85$. Why? No direct evidence. Generates effects quantitatively consistent with empirical evidence.

- A quantitative version of our toy model. Important parameters: costs of adjusting capital, of adjusting factor proportions (instantaneous labor demand is vertical).

- Results: Figures 3, 4. The increase in the unemployment rate is largest after 9 years, equal to about 4.5%.

- The associated loss in output (relative to its balanced growth path value) 10 years out is equal to nearly 5%. Figure 4.

So can explain much of the 70s for sure, a good part of the 80s.

THE SWINGS IN REAL INTEREST RATES

- The evidence. Evolution of ex-ante real interest rates. From 2% in the 1960s to -2% in the 1970s to 5% in the 90s.

  Differences across countries. Look at Germany, and Spain.

- Implications for equilibrium unemployment?
  - Net profit goes down, so capital goes down. At a given wage, so does employment.
  - Higher unemployment lowers the wage, reducing both the loss, and increasing the ratio of capital to labor.
  - Net effect is still a reduction in unemployment.

How much and how long? A simulation

Same assumptions as before on the production side.

Figure. An increase of 10%, down by 0.9 per year. Unemployment is higher by 5% after 8 years, before eventually returning to normal.

Conclusion: The downs and ups of the real interest rate led to relatively lower (than it would have been) equilibrium unemployment in the 1970s, higher (than it would have been) in the 1980s, perhaps up to the mid 1990s.

Where did the swings come from?

- Shifts in saving, or in investment? Or monetary policy?

- Bruno Sachs at the time. Transfer of wealth to oil producers–high savers. Phelps, and fiscal policy: timing does not fit.

- In hindsight, looks like monetary policy.

  Can monetary policy really affect the equilibrium rate of unemployment for so much for so long? (I think the answer is yes) And if so, what implications?

  Two open questions

  Effect of monetary policy on the actual and the equilibrium rate of unemployment.

  Was it a good idea for monetary policy to shift some of the unemployment from the 1970s to the 1980s–if it did?

LOOKING AT ONE COUNTRY: FRANCE

(More formal treatment, for all countries, in "The Medium Run". But may be more revealing to look at one country). France is quite representative of the evolution of the E5.

Model suggests constructing and looking at g_a; (w/a) and (an/k); π, uc, and i/k.

(Warning 1: construction OK if technological progress is Harrod neutral. Seems to be true over long periods of time, but no guarantee. If not Harrod neutral, can be seriously misleading.)

(Warning 2. Keynesian business cycles can introduce spurious correlations. Low output, low measured tfp growth, high wage per measured efficiency unit).

- The increase and the decrease in w/a.
- The evolution of an/k
- The evolution of π and c. The large movements in c relative to π. Measurement issues. Early 80s: low π, high c.

- π, c and i/k. (Issue: costs of adjustment to what? implicitly here: gross investment). (Note: on the new balanced growth path, lower g_a implies a lower i/k).

So can clearly see the evolutions discussed earlier, and the role of g_a and c. But also clear puzzles—the topics of Lecture 2:

- Looking across countries. Why earlier/ more wage moderation (the Netherlands, Ireland) in some countries than in others?

- Why so little recovery in an/k in the 1990s, and by implication, so limited a decrease in unemployment, despite wage moderation?

  (In simulations for France (Medium Run), given actual time paths of w/a and c, and no other shocks, unemployment starts declining from the mid 1980s on)

  Looked at another way: Why the dramatic decline in the labor share in the 1980s and 1990s in most Continental European countries?

Points to union behavior, and the nature of collective bargaining. Lecture 2.